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Specification

1. Title of the Invention

Disk Loading Apparatus for Disk Player

What is claimed is:

1. A disk loading apparatus for use in a disk player reproducing information from a single or plural disks comprising a disk tray loading unit and a disk playing block up and down unit; said disk tray loading unit including at least a driving source, a disk tray sliding plate 13 having a rack portion 13a, and a complex gear 12 which has a first gear portion 12c formed along a part of a full periphery to be engaged with said rack portion 13a of the disk tray sliding plate 13 and a non-tooth portion 12b formed in a same plane as the first gear portion 12c as well as a second gear portion 12a formed coaxially and integrally with said gear along a part of a full periphery and a locking portion 12d formed on a same plane as said second gear portion 12a, and said disk playing block up and down unit includes at least a Geneva gear 14 having a sector gear portion 14a which is engaged with the gear portion 12a formed along a part of a full periphery of said complex gear 12 and a locking portion 14c which is engaged with the non-tooth portion 12d of said complex gear and a disk playing block up and down plate 16 for moving a disk playing block up and down, whereby said disk tray loading unit and disk playing block up and down unit is selectively composed into a first constructional mode in which said units are driven by a single driving source or a second constructional mode in

which said units are independently driven by two driving sources.

3. Detailed Explanation of the Invention

[Applicable Field in Industry]

The present invention relates to a disk loading apparatus for use in a disk player for reproducing a disk such as compact disk and laser disk. Particularly, the present invention relates to a disk loading apparatus for a disk player reproducing a single or plural disks.

[Prior Art]

In known disk loading apparatuses for use in compact disk player and laser disk player, a combination of gears and cams or a combination of gears having non-tooth portions is utilized to transmit a driving force of a single driving source. For instance, as illustrated in Fig. 1, a driving force of a driving motor 1 is transmitted from a small gear 2 secured to a driving shaft to a complex gear 5 via an idler 21 and an idler 22. The complex gear 5 includes a first gear portion 5b which is engaged with a tray sliding rack 7. When the complex gear 5 is rotated, the rack 7 is moved to perform a disk loading. After the disk loading, a second gear portion 5a of the complex gear 5 is engaged with a rack portion 6a of a disk up and down cam plate 6. When the disk up and down cam plate 6 is moved, a disk playing block 8 is moved up and down.

[Problems to be Solved by the Invention]

In the known disk loading apparatus, if it is required to use two driving forces for the disk loading and the up and down movement of the disk playing block, a design of the disk loading apparatus must be changed to a great extent in order to save a space and to solve problems in manufacturing.

The present invention has for its object to provide a disk loading apparatus, in which a plurality of operations can be carried out by plural driving sources independently by simply changing parts and arrangement of parts to provide various apparatus having different specifications, while a space is not increased and an extensive design change is not required.

[Means for Solving the Problems]

According to the invention, a disk loading apparatus for use in a disk player reproducing information from a single or plural disks comprises a disk tray loading unit and a disk playing block up and down unit; said disk tray loading unit including at least a driving source, a disk tray sliding plate 13 having a rack portion 13a, and a complex gear 12 which has a first gear portion 12c formed along a part of a full periphery to be engaged with said rack portion 13a of the disk tray sliding plate 13 and a non-tooth portion 12b formed in a same plane as the first gear portion 12c as well as a second gear portion 12a formed coaxially and integrally with said gear along a part of a full periphery and a locking portion 12d formed on a same plane as said second gear portion 12a, and said disk playing block up and down unit includes at least a Geneva gear 14 having a sector gear portion 14a which is engaged with the gear portion 12a formed along a part of a full periphery of said complex gear 12 and a locking portion 14c which is engaged with the non-tooth portion 12d of said complex gear and a disk playing block up and down plate 16 for moving a disk playing block up and down, whereby said disk tray loading unit and disk playing block up and down unit is selectively composed into a first constructional mode in which said units are driven by a single driving source or a second constructional mode in which said units are independently driven by two driving sources.

[Embodiments]

Now an embodiment of the disk loading apparatus according to the invention will be explained with reference to the drawings.

Figs. 2-4 show an embodiment of the disk loading apparatus according to the invention, in which a single driving source is provided. Fig. 2 illustrates a condition in which a disk playing block is in the lowermost position.

In Fig. 2, a driving force of a driving motor 9 serving as a single driving source is transmitted to a complex gear 12 via a worm 10 secured to a driving shaft of the motor 9 and a worm wheel 11. The complex gear 12 includes a first gear portion 12c formed along a part of a full periphery and a non-tooth portion 12b situating on a same plane as the first gear portion 12c. The complex gear 12 further comprises a second gear portion 12a formed coaxially and integrally with said first gear portion 12c along a part of a full periphery and a locking portion 12d formed on a same plane as the second gear portion 12a. The locking portion 12c is engaged with a tray sliding rack 13 to move the tray sliding rack 13 reciprocally in directions A1 刧 A2. The second gear portion 12a of the complex gear 12 is engaged with a sector gear portion 14a of a Geneva gear 14 and the driving force is transmitted via an idler 15 to a disk playing block up and down plate 16 to move this plate reciprocally in directions B1 刧 B2. In this manner, a disk playing block 17 is moved up and down.

Fig. 5 shows a second embodiment of the disk loading apparatus according to the invention. In the present embodiment, there are provided two driving sources. The Geneva gear 14 provided in the first embodiment is removed and a second driving motor 19 and a worm 20 secured to a shaft of the second driving motor 19 are provided such that the worm 20 is engaged with the worm wheel 15. In a block I, the driving force generated by the first driving motor 9 is transmitted to the complex gear 12 via the worm 10 secured to the shaft of the driving motor 9 and the worm wheel 11 and the tray sliding plate 13 is reciprocally moved in the directions A1 刧 A2 by means of the engagement of the gear portion 12c formed along a part of a full periphery with a rack portion 13a formed on the tray sliding plate 13. In a block II, the driving force of the second driving motor 19 is transmitted from the worm 20 secured to the shaft of the driving motor 19 to a spur gear 15b via the idler 15 to move reciprocally the disk playing block up and down plate 16 in the directions B1 刧 B2 by the engagement of the spur gear 15b with a rack portion 16a of the disk playing block up and down plate 16.

(Function)

Now the operation will be explained.

Fig. 2 shows a condition in which the tray has been fully installed into the apparatus and the tray sliding plate 13 is moved into the direction A1. Before this condition, a loading switch not shown in the drawing is pushed to rotate the driving motor 9, and the rotational force of the driving motor 9 is transmitted to the complex gear 12 via the worm 10 and worm wheel 11. Then, the complex gear 12 is rotated in the direction C2 and the second gear portion 12c of the complex gear 12 is engaged with the rack portion 13a of the tray sliding plate 13 to move the tray sliding plate 13 in the direction A1.

As illustrated in Fig. 2, under the condition that the non-tooth portion 12d of the complex gear 12 is engaged with the locking portion 14c of the Geneva gear 14, the Geneva gear 14 is not rotated although the non-tooth portion 12d rotates. The complex gear 12 is further rotated in the direction C2, and the gear portion 12a formed along a part of a whole periphery is engaged with the sector gear portion 14a of the Geneva gear 14 to rotate the Geneva gear 14 in the direction D2. It should be noted that at this time, the operation of the tray sliding plate 13 has been completed. The rotational driving force is transmitted to the disk playing block up and down plate 16 via the idler 15 to move the disk playing block 17 upward. During this operation, the rack portion 13a of the tray sliding plate 13 is opposed to the non-tooth portion 12b of the complex gear 12 and the a lock portion 12f provided on the complex gear 12 is engaged with a rib of the tray (not shown in the drawings) to lock the tray. Therefore, the tray is remained in a stationary condition.

As illustrated in Figs. 3 and 4, when the complex gear 12 is rotated in the direction C2, the disk playing block up and down plate 16 is moved in the direction B1 and the disk playing block 17 is moved into the uppermost position. Then, a pin 16c provided on the disk playing block up and down plate 16 actuates a switch 18 to send a signal for stopping the driving motor 9. In this manner, the disk loading operation is completed. The disk unloading operation will be performed in an opposite sequence to that of the disk loading operation just explained above.

Fig. 5 shows the embodiment having the two driving sources. In a block I, the driving force generated by the first driving motor 9 is transmitted to the complex gear 12 via the worm 10 and worm wheel 11 to rotate the complex gear 12 in the direction C2. Then, the tray sliding plate 13 is moved in the direction A1 into the disk loading position. After a switch (not shown in the drawing) for detecting a completion of the movement of the tray is changed to ON, the rotation of the second driving motor 19 in the block II is initiated. Then, the driving force of the second driving motor 19 is transmitted from the worm 20 to the rack portion 16a of the disk playing block up and down plate 16 via the worm wheel 15 and spur gear 15b provided coaxially and integrally with the worm wheel 15 to move the disk playing block up and down plate 16 in the direction B1. Then, the disk playing block 17 is moved upward to complete the disk loading.

The discharge of the disk may be carried out in an opposite sequence to that for the disk loading operation just explained above. As stated above, the block I and block II are operated independently from each other, and the control of the operation timings is performed by the detection switch.

[Merits of the Invention]

As explained above, in the disk loading apparatus according to the invention, the driving mechanism performing a plurality of continuous operations can be divided into a plurality of mechanisms each performing operations independently with a simple exchange of parts and arrangement without necessity of a large change in construction. Therefore, various products having different specifications can be supplied simply and easily, and thus the product cost can be reduced and product process can be simplified.

4. Brief Description of the Drawings

Fig. 1 shows a known disk loading apparatus; Figs. 2-5 illustrate the disk loading apparatus according to the present invention, in which Fig. 2 shows a condition in which a disk playing block is in the lowermost position in a first embodiment, Fig. 3 shows a condition in which the disk playing block is moving, Fig. 4 depicts a condition in which the disk playing block is in an uppermost position, and Fig. 5 illustrates a second embodiment of the present invention, in which the driving mechanism is divided into two blocks.

12···complex gear, 12a, 12c···gear portion, 12b···non-tooth portion, 12d···locking portion, 13···tray sliding plate, 13a···rack portion of tray sliding plate, 14···Geneva gear, 14a···sector gear portion, 14c···locking portion, 16···disk playing block up and down plate, 17···disk playing block